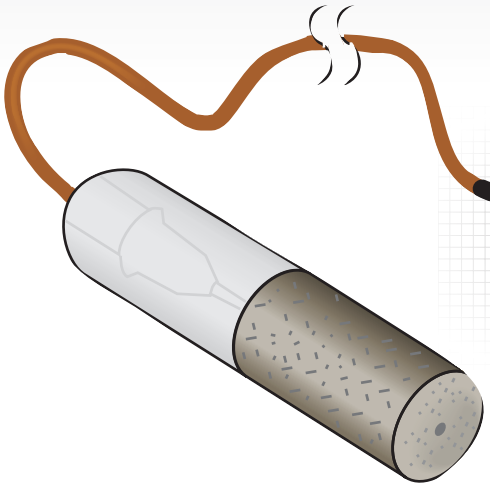
CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

229, CE4, and CE8

Water Matric Potential Sensor and Current Excitation Modules



Reliable Water Measurements

No maintenance required

Overview

Campbell Scientific's 229 Water Matric Potential Sensor measures soil water potential from -10 to -2500 kPa. The sensor must be connected to either a CE4 or CE8 current excitation module. A Campbell Scientific datalogger controls the current excitation module, measures the probe, and calculates soil water matric potential.

Benefits and Features

- Compatible with most Campbell Scientific dataloggers[1]
- Measures a wide range of matric potential
- Measurements not affected by salts in the soil
- Long lasting, with no maintenance required
- Compatible with AM16/32-series multiplexers allowing measurement of multiple sensors

229 Measurement Details

The 229 Water Matric Potential Sensor consists of a heating element and thermocouple placed in epoxy in a hypodermic needle, which is encased in a porous ceramic matrix.

To calculate soil water matric potential, a CE4 or CE8 current excitation module applies a 50 mA current to the 229's heating element, and the 229's thermocouple measures the temperature rise. The magnitude of the temperature rise varies according to the amount of water in the porous ceramic matrix, which changes as the surrounding soil wets and dries. Soil water matric potential is determined by applying a second-order polynomial equation to the temperature rise. Users must individually calibrate each of their 229 sensors in the soil type in which the sensors will reside.

A reference temperature measurement is required for the 229's thermocouple measurement. Options for measuring the reference temperature include:

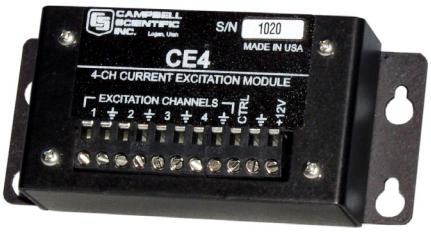
- Thermistor built into the CR800, CR850, CR1000, CR3000, or CR5000 wiring panel
- PRT built into the wiring panel of the CR9050 or CR9051E input module for the CR9000X Measurement and Control System

[1]*The 229 is not compatible with our CR200(X)-series or CR510 dataloggers.*

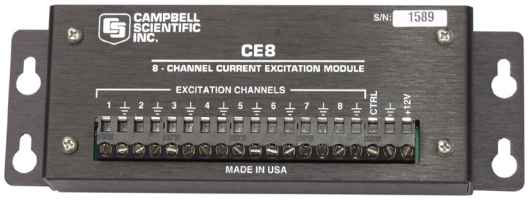
Current Excitation Modules

Either a CE4 or CE8 current excitation module can provide a constant current to the heating element of the 229. The CE4 sources current for up to four 229s, and the CE8 sources current for up to eight. Both modules require a 12 Vdc power source.

The number of 229 sensors measured by one datalogger can be increased by connecting a CE4 or CE8 to one or more AM16/32-series multiplexers[2]. Up to four multiplexers can be connected to the CE4, and up to eight multiplexers can be connected to the CE8.



The CE4 can source current for four 229 sensors directly. The outputs of the CE4 can be connected to as many as four multiplexers, greatly expanding system capacity.



The CE8 can source current for eight 229 sensors directly. The outputs of the CE8 can be connected to as many as eight multiplexers, greatly expanding system capacity.

Ordering Information

Water Matric Potential Sensor

229-L Heat Dissipation Matric Potential Sensor with user-specified lead length. Enter lead length, in feet, after the -L. Recommended length is 25, 50, 75, or 100 ft (8, 15, 23, or 31 m). Must choose a cable termination option (see below).

Cable Termination Options (choose one)

-PT Cable terminates in stripped and tinned leads for direct connection to a datalogger/current excitation module terminals.

-PW Cable terminates in a connector for attachment to a prewired enclosure.

Current Excitation Modules (choose one)

CE4 Four-Channel Current Excitation Module

CE8 Eight-Channel Current Excitation Module

Cable for Current Excitation Modules

CABLE3CBL-L 22-AWG, three-conductor cable with user-specified lead length. Enter lead length, in feet, after the -L. This cable can be used to connect a CE4 or CE8 to the datalogger.

Specifications

229 Water Matric Potential Sensor

- Measurement Range: -10 kPa to -2500 kPa
- Measurement Time: 30 s typical
- Thermocouple Type: copper/constantan (type T)
- Heater Resistance: ~34 Ω
- Resolution: ~1 kPa at matric potentials < -100 kPa
- Diameter: 1.5 cm (0.6 in)
- Length: 6.0 cm (2.4 in)
- Sensor Weight: 10 g (0.35 oz)
- Cable Weight: ~23 g/m (0.25 oz/ft)

CE4/CE8 Current Excitation Modules

- Output: 50 mA ±0.25 mA, regulated
- Output Channels
  CE4: 4
  CE8: 8
- Power: 12 Vdc source required
- Active Current Drain:
  25 mA + (50 mA) x (number of 229s connected to the CE4 or CE8)
- Dimensions
  CE4: 11.5 x 5.4 x 2.7 cm (4.5 x 2.1 x 1.1 in)
  CE8: 16.5 x 5.4 x 2.7 cm (6.5 x 2.1 x 1.1 in)
- Weight
  CE4: 131 g (4.6 oz)
  CE8: 184 g (6.5 oz)

[2]The CE4 and CE8 modules switch currents that are greater than 30 mA, which degrades the contact surfaces of the mechanical relays. Therefore the multiplexer channels to which the CE4 or CE8 have been connected may become unsuitable for other applications (refer to the multiplexer manual for more information).

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